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| APPLICATION NO.           | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.   | CONFIRMATION NO. |
|---------------------------|-------------|----------------------|-----------------------|------------------|
| 10/775,370                | 02/09/2004  | My Nguyen            | ALTRP084C1            | 9930             |
| 22434                     | 7590        | 12/28/2004           | EXAMINER              |                  |
| BEYER WEAVER & THOMAS LLP |             |                      | WILLIAMS, ALEXANDER O |                  |
| P.O. BOX 70250            |             |                      | ART UNIT              |                  |
| OAKLAND, CA 94612-0250    |             |                      | PAPER NUMBER          |                  |

2826

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/775,370

Applicant(s)

NGUYEN, MY

Examiner

Alexander O Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-17 and 19 is/are rejected.
- 7) ☐ Claim(s) 6 and 18 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/9/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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Serial Number: 10/775370 Attorney's Docket #: ALTRP084C1

Filing Date: 2/9/2004;

Applicant: Nguyen

Examiner: Alexander Williams

Applicant's election without traverse of Group I (claims 1 to 7 and 15 to 19), filed 10//04, has been acknowledged.

This application contains claims 8 to 14 drawn to an invention non-elected without traverse

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The disclosure is objected to because of the following informalities: Applicant's related applications information should be updated.

Appropriate correction is required.

The use of the trademark APEX on page 5, line 28 and (product number 4549, 8439) on page 6, lines 8-10 has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 5 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by Mei et al. (U.S. Patent # 6,307,160).

1. Mei et al. (figures 1 to 5) specifically figure 4 show a flip chip package, comprising: a flip chip **2** bound to an electroless nickel immersion gold packaging substrate **5**; and a doped solder ball array bonded to under bump metallization on the packaging substrate via an interface, the solder balls of the array comprising, a Pb/Sn bulk solder **16**, and a metal dopant selected from the group consisting of Cu and Ni in an amount of at least 0.2% by weight.
2. The package of claim 1, Mei et al show wherein the metal dopant in the bulk solder bonds or complexes with phosphorus from the under bump metallization.
4. The package of claim 1, Mei et al. show wherein the metal dopant is in an amount of about 0.2% to 2.5% by weight.
5. The package of claim 1, Mei et al. show wherein the metal dopant is Cu.
7. The package of claim 1, Mei et al. show wherein the metal dopant is Ni.

Initially, and with respect to claim 2, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15

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at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear.

Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Mei et al. (U.S. Patent # 6,307,160).

As to the grounds of rejection under section 103, see MPEP § 2113.

Claims 1 to 5 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gorrell et al. (U.S. Patent Application Publication # 2002/0045036 A1) in view of Mei et al. (U.S. Patent # 6,307,160).

1. Gorrell et al. (figures 1 to 7) specifically figure 4 show a flip chip package, comprising: a flip chip (**inherit**) bound to an electroless nickel immersion gold packaging substrate (the substrate); and a doped solder ball array **50** bonded to under bump metallization **51,52,53** on the packaging substrate via an interface, the solder balls of the array comprising, a Pb/Sn bulk solder **50**, but fail to explicitly show a metal dopant selected from the group consisting of Cu, Al and Ni in an amount of at least 0.2% by weight. However, the metal of Cu or Ni from the pads are connected to the solder ball.

Mei et al. is cited for showing high-strength solder interconnect for copper electroless nickel immersion gold metallization solder pad. Mei et al. (figures 1 to 5) specifically figure 4 discloses a Pb/Sn bulk solder **16**, with a metal dopant selected from the group consisting of Cu and Ni in an amount of at least 0.2% by weight for the purpose of providing a high strength solder interconnect on a solder pad.

2. The package of claim 1, the combination with Mei et al. showing wherein the metal dopant in the bulk solder bonds or complexes with phosphorus from the under bump metallization.

3. The package of claim 1, the combination with Gorrell et al. showing wherein the under bump metallization comprises vias filled with successive layers of copper, nickel and gold.

4. The package of claim 1, the combination with Mei et al. showing wherein the metal

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dopant is in an amount of about 0.2% to 2.5% by weight.

5. The package of claim 1, the combination with Mai et al. showing wherein the metal dopant is Cu.

7. The package of claim 1, the combination with Mei et al. showing wherein the metal dopant is Ni.

Therefore, it would have been obvious to one of ordinary skill in the art to use Mei et al.'s solder ball's metal dopant to modify Gorrell et al.'s solder balls for the purpose of providing a high strength solder interconnect on a solder pad.

As to the grounds of rejection under section 103, see MPEP § 2113.

Claims 15 to 17 and 19 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gorrell et al. (U.S. Patent Application Publication # 2002/0045036 A1) in view of Mei et al. (U.S. Patent # 6,307,160) and further in view of Li (U.S. Patent # 6,286,206 B1).

The combination of Gorrell et al./Mei et al. show the features of the claimed invention as detailed above, but fail to explicitly show a flip chip bound to an electroless nickel immersion gold packaging substrate and a printed circuit board.

Li is cited for showing a heat resistant electronic system and circuit boards. Specifically, Li (figure 1 to 11) specifically figure 8 discloses a flip chip package with Pb/Sn solder balls bound to a printed circuit board for the purpose of strengthening the solder interconnect.

16. The package of claim 1, the combination with Mei et al. showing wherein the metal dopant is in an amount of about 0.2% to 2.5% by weight.

17. The package of claim 1, the combination with Mai et al. showing wherein the metal dopant is Cu.

19. The package of claim 1, the combination with Mei et al. showing wherein the metal dopant is Ni.

Therefore, it would have been obvious to one of ordinary skill in the art to use Li's connection to the printed circuit board and Mei et al.'s solder ball's metal dopant to modify Gorrell et al.'s solder balls for the purpose of providing a high strength solder interconnect on a solder pad.

Claims 6 and 18 are objected to as being dependent upon a rejected base claim,

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but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Any such indication as to the allowability of these claims is reserved until which time a suitable response is filed.

The listed references are cited as of interest to this application, but not applied at this time.

| Field of Search   | Date     |
|---|----------|
| U.S. Class and subclass:<br>257/737,738,778,779,772,786,784,734,668,692,693<br>174/256,260,259,261<br>361/767,768,771,783<br>29/840,832,852,846<br>156/283<br>228/262.6,262.3<br>427/96                               | 12/22/04 |
| Other Documentation: foreign patents and literature in<br>257/737,738,778,779,772,786,784,734,668,692,693<br>174/256,260,259,261<br>361/767,768,771,783<br>29/840,832,852,846<br>156/283<br>228/262.6,262.3<br>427/96 | 12/22/04 |
| Electronic data base(s): U.S. Patents   | 12/22/04 |

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander O Williams whose telephone number is (571) 272 1924. The examiner can normally be reached on M-F 6:30-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AOW  
12/22/04



Primary Patent Examiner  
Alexander O. Williams